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AGRICULTURAL EDUCATION: ELEMENTARY AND SECONDARY SCHOOLS

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One of the most important recent tendencies in education is the redirection of schools of a community in terms of the daily welfare of its people. For a rural community such redirection must be largely in terms of agriculture and of other country-life interests. It is for this reason that so much emphasis is placed upon agriculture as a means of increasing the efficiency of rural schools.

When this idea began to express itself in practice in rural communities the elementary school was the first to receive attention. But age of pupils, many grades in one room, lack of properly qualified teachers, and various other limitations have led many to doubt the wisdom of this selection. The results of introducing agriculture as a school subject into the elementary schools have thus far not been entirely satisfactory. Nevertheless adjustments are taking place, so that agriculture, not as a systematized subject of instruction but in certain of its nature-study aspects, will no doubt find an important place. About all that may reasonably be expected of agriculture in the elementary schools is to interest the children in country-life subjects so that they may know the common birds, insects, trees, weeds; the meaning of some of the best farm practices, such as selecting and testing seed, how the soil holds water and means of preventing its loss, care of milk and value of its fat content, etc.; and through such studies to lead the children to appreciate the fact that there is something worth while in the immediate world in which they live.

The rural high school is now being recognized as the best place below the college for instruction in agriculture. Such a high school is closely related to rural education in two ways:

one in the adjustment of its own work to the industrial and social needs of its community, the other in giving its graduates who expect to teach in rural elementary schools some preparation for teaching country-life subjects.

ELEMENTARY SCHOOLS

The introduction of agricultural subjects into elementary schools has proceeded mainly along two lines—one as a result of legislation, the other as a natural outgrowth of boys' agricultural clubs.

In many places in states where agriculture is a required subject for instruction in rural schools no such legislation was really needed, for the subject was already being introduced in a sane and effective way, and was being made use of as far as the experience of the teacher and conditions of the school environment would permit.

The results of compulsory teaching of agriculture in the elementary schools have been twofold: first, in stimulating those in charge of the administration to provide helps to those teachers who are expected to carry out the provisions of the law; second, in the production and use of textbooks on elementary agriculture. The first has been done through bulletins, teachers' leaflets, institute instruction, summer normal schools, and in various other ways. Some agricultural colleges have been called upon to give attention to elementary education sooner than they otherwise would. They have been forced to study the rural-school situation and devise means for improving it. The work of state offices of education and of agricultural colleges in promoting agricultural education in rural communities has already been considered somewhat in detail in previous articles of this series.¹ But the contributions of these two agencies to agricultural education in elementary schools must not be ascribed wholly to legislation, for in several states having no requirements as to teaching of agriculture both state departments of education and agricultural colleges have done excellent service

¹ This journal, Vol. X, Nos. 3, 4, and 6.

in providing helps for teachers wishing to introduce the subject in their schools.

The second result has been less satisfactory. Indeed, in some instances it has proved a positive detriment to agricultural education. It has in effect added another textbook subject to an already crowded rural-school curriculum, for many teachers, in spite of whatever suggestions they may receive from leaflets or institute instruction, know of no other way to teach except by means of a textbook. It has put undue emphasis on the agricultural textbook. More than a score of elementary textbooks have appeared within a decade. Publishers have been very active in securing the use of their books in the rural schools.² While the value of a good textbook must be conceded, it is apt to be the means of substituting agricultural information for real agricultural instruction. The kind of agricultural instruction best adapted for the elementary schools cannot be given merely by means of recitations from a textbook.

There may be some justification in making the teaching of a subject compulsory on the ground that otherwise it would never be taught. On the other hand it may seriously be questioned, since the whole burden of such a measure falls upon the teachers, whether efficient teaching of any subject may be secured by mandatory legislation. The length of teaching service of the average rural teacher is very short, perhaps less than three years. As a result rural teachers are constantly being recruited from the young graduates of grammar and high schools. It is claimed by some that whatever preparation these inexperienced teachers may make is largely determined by what they are expected to teach. If they must teach agriculture they will make some effort to prepare themselves to teach this subject. It is probably on this theory that so many states have tried this plan of introducing agriculture into the rural schools. At least sixteen states have tried this plan, and in several other states bills providing for such instruction are being considered by

²The subject of textbooks on agriculture will be considered in the next article of this series.

legislatures now in session. Doubtless some of these bills will become laws.

The second line of development of agricultural education in elementary schools has produced a much better type of instruction than the former or mandatory method. This is partly because the results of boys' clubs have shown the value of agriculture as a school subject, and have thus secured for it public approval and support, and partly because experience in managing these clubs has given the teachers some insight into methods of adapting the subject to the needs of the school, and of making it an effective part of the regular school work.

Teachers who have been the most successful are those who have selected agricultural subjects of special interest to the school community, and who have used methods calling for self-activity on the part of the pupils—having the pupils learn by doing rather than by reciting. The following is a list of various kinds of work reported to be successfully adapted to rural schools (124)³: experimental plots for plant breeding, soil inoculation, and other soil experiments; ear-to-row method of improving corn, and use of acre plots; seed germinating including tests of viability; collection of economic plants, weeds, weed-seed, and insects; budding, grafting, pruning, and spraying fruit trees; milk testing with Babcock milk tester.

The importance attached by pupils and patrons to such work is well illustrated by the following report. In one county in Iowa it is the practice for each school to have in the spring a germinating test for corn. One teacher says of this work:

My boys who would not go across the road for a song book went two miles in the snow to get some sawdust for a germinating box. When the corn had germinated, the farmers came to the schoolhouse to see how their corn had turned out, and incidentally saw the work of the school. Why, farmers came who couldn't remember when they had been inside the schoolhouse before! (125, p. 18).

The rural school is badly in need of redirection, but it will take more than the teaching of agriculture to bring this about.

³References by number are to corresponding numbers in the bibliography at the end of this article, or in bibliographies appended to other articles of this series.

However, some sort of nature-study agriculture that has elements of interest to pupils and parents alike may do much toward putting the rural school in the way of redirection. Here and there are promises of the fulfilment of L. H. Bailey's vision of a rural school living up to its possibilities. Referring to the kind of agricultural studies suggested in the above report, he says:

All such teaching as this will call for a new purpose in the school building. The present country-school building is a structure in which children sit to study books and recite from them. It should also be a place in which the children can work with their hands. Every school building should have a laboratory room, in which there may be a few plants growing in the windows, and perhaps an aquarium and terrarium. Here the children will bring flowers and insects and samples of soil, and varieties of corn or cotton in their season, and other objects that interest them, and here they may perform their simple work with tools. Even if the teacher cannot teach these subjects, the room itself will teach. The mere bringing of such objects would have a tremendous influence on children: patrons would ask what the room is for; in time a teacher would be found who could handle the subject pedagogically. Now we see children carrying only books to school; some day they will also carry twigs and potatoes and animals and tools and contrivances and other personal objects (102).

SECONDARY SCHOOLS

Previous to 1906 there were but few high schools (excepting agricultural high schools) giving instruction in agriculture; in 1906-7 there were 75-80; in 1907-8, 240-50; in 1908-9, over 500; in 1909-10, probably 1,000; in 1910-11, incomplete data indicate as many as 1,500. The number of agricultural high schools (those giving two or more years of agricultural instruction) in 1909 was 125; in 1910, 144. Of these there were receiving local support, in 1909, 24; in 1910, 33; receiving state aid in 1909, 29; in 1910, 39; technical schools giving agricultural instruction in 1909, 37; in 1910, 47; connected with agricultural colleges in 1909, 34; in 1910, 35.⁴

Secondary agricultural education has developed along several lines, giving rise to as many as eight more or less distinct types, viz., (a) agricultural-college, (b) district, (c) country,

⁴The above data were taken from a manuscript article on "Agriculture in High Schools," written by C. H. Robinson and soon to appear as one of the Columbia University publications.

(*d*) village-township, (*e*) city, (*f*) state aid, (*g*) technical, (*h*) normal.⁵

The agricultural-college type is well illustrated by the School of Agriculture of the University of Minnesota. This school has the distinction of being one of the first secondary schools of agriculture. It was

organized in 1888 with the object of giving practical education to young men and women who are unable to pursue the full college course in agriculture. It offers a practical course of study designed to fit young men and women for successful farm life, and aims to give its students the necessary preparation for useful citizenship (127, p. 8).

The district type is found in Alabama, Arkansas, Georgia, Oklahoma, and Virginia. The districts in each of these states except Oklahoma correspond to the several congressional districts. The objects of all these schools are similar and are summed up in the following statement concerning the Alabama District Agricultural Schools which were the first of this type of schools to be established:

To turn out young men well grounded in the underlying principles of scientific and practical agriculture, that they may make successful planters and advance the farming interests of the state.

To give such instruction and training as will fix in the minds of the young men high ideals of country-life education, as is done in the best agricultural high schools under the name of "agriculture and home economics."

To educate and fully equip young men and women for efficient teaching in the public schools of the state.

To prepare those who desire to enter higher institutions of learning (128, p. 15).⁶

The establishment of county agricultural high schools is now authorized in at least twenty-one states. In many of these states such schools receive state aid. The county schools of Wisconsin are the oldest and best known. In the Wisconsin schools

the courses are two years in length and include subjects of general agriculture; biology and physical subjects; laboratory and field and shop work:

⁵The first four types of this classification are suggested by G. A. Bricker in his *Teaching of Agriculture in the High School*, chap. ii (126).

⁶See *Georgia District Agricultural Schools*, 129.

domestic science, home economy, and hygiene; sewing and millinery; farm management and accounts, besides courses in English, history, civics, and other branches of the usual high-school type (126, p. 23).

The Baltimore County (Md.) Agricultural High School presents some features that deserve special mention:

The school is meant especially to meet the needs of a rural community. It presents all the usual subjects taught in high schools, except foreign languages, and in addition teaches agriculture, domestic science, and manual training. It is thus planned that students graduating from this school will, in addition to a good general or academic education, have some industrial or vocational training to fit them to take their places in the world (130, p. 1).

The principal, who is a specialist in agriculture, devotes the entire year to the school, spending the usual summer vacation in the interests of the school, inspecting and directing the work of the pupils who are carrying out in a practical way experiments and problems outlined during the school year. In this manner the principles of agriculture taught in the school are carried over into practice under normal farming conditions. In addition to offering excellent instruction in agriculture and in other subjects, the school further serves the community by giving courses for farmers and their wives, and to rural-school teachers, and by furnishing a center for religious service and literary and social activities for the young people (131).

Most of the high schools giving instruction in agriculture are of the village-township type. The work of two of these high schools which were among the first to make agriculture a subject of instruction has already been referred to in a previous article of this series.⁷ The motive for reorganizing rural village and township high schools on the basis of country-life interests is well expressed in an account of the New Holland (Ohio) High School:

The larger percentage of the boys and girls who are enrolled in the village and township high schools of this state will spend their lives either in the rural districts or villages where farm life and agricultural industries are the leading interests. They will be either farmers or farmers' wives, or they will be engaged in business very intimately connected with agriculture. In

⁷ This journal, Vol. X, No. 6.

view of this condition the Board of Education at New Holland, Ohio, has placed agriculture in the curriculum of the high school (132, p. 3).

Another of the earlier schools of this type whose success has attracted considerable attention is the John Swaney School, Putnam County, Illinois (133).

High schools of cities surrounded by agricultural communities enrol a large number of pupils from the country. The special needs of such pupils have recently been recognized by a few city high schools. Thus in the Stockton (Cal.) High School a department of agriculture was organized at the beginning of the present school year. A director, who is an agricultural-college graduate, has charge. He is not expected to teach more than one-third of his time; the rest of his time is to be devoted to the "study of agricultural problems at first hand throughout the farm-area tributary to Stockton." He is to take up any agricultural problem at any time, go to the farm, and help find a solution. By this means the farmer is reached directly and made to feel that our school director and teachers are willing and able to educate boys and girls for profitable farm life and to cope with economic problems troublesome and burdensome to them. Short courses are also offered to farmers and those interested in agriculture who cannot take the full course. A course is offered to students who expect to be teachers with a view of providing the rural schools with teachers having a knowledge of, and an interest in, farm life. Further aid is given the rural schools by a series of teachers' meetings and conferences with the director in charge (134).

The Gardena High School of Los Angeles has been offering courses in agriculture with particular reference to horticulture, gardening, and poultry raising which are the dominant interests of the community (135). The San Diego (Cal.) High School has also recently established a department of agriculture somewhat after the Stockton plan.

Agriculture in city high schools located in farming regions offers a very promising field for further development. These schools have advantages that compensate somewhat for their immediate non-rural surroundings. Their laboratory fa-

cilities are usually very good, and they are able by means of high salaries to secure experienced and well-equipped teachers.

In order to encourage the introduction of agriculture into rural high schools some states have offered the inducement of state aid to a limited number of schools undertaking this work. For example Minnesota is now giving for this purpose \$2,500 to each of ten high schools. Ten more are soon to be added to this number. This method has some advantages over entire local support, for it not only makes possible the securing of good teachers but provides for a higher standard of efficiency than is likely to be secured by a purely local management.

The Hinckley State High School which is a good example of this type of high school organized in Minnesota offers the following courses: literary course, four years; agricultural-industrial course, four years; special agricultural course, two years; short course for institutes for farmers; normal course for rural teachers, one year (136).

A somewhat different plan of state aid to high schools giving instruction in agriculture, mechanic arts, and home-making is being worked out in New York. The following extract from the educational law of 1901 will indicate the scope of the New York plan:

The Commissioner of Education in the annual apportionment of the state school moneys shall apportion therefrom to each city and union free school district the sum of \$500 for each independently organized general industrial school, trade school, or school of agriculture, mechanic arts and home-making, maintained therein for 38 weeks during the school year and employing one teacher whose work is devoted exclusively to such school, and having an enrolment of at least 25 pupils, and maintaining a course of study approved by him. The Commissioner shall also make an additional appropriation to each city or union free school district of \$200 for each additional teacher employed exclusively in such schools for 38 weeks during the school year (137, p. 3).

In order to secure successful operation of this law, the organization and general oversight of all schools receiving state aid for teaching agriculture are under the direction of the State Department of Agricultural Education. The State Department of Education has also prepared a very complete series of syllabi

of courses in agriculture for high schools. From this series it is possible for a school to select subjects adapted to the particular agricultural interests of the community (138).

Agriculture in the technical type of secondary schools receives much the same attention as in the district type, the chief difference being that the latter offers no courses in mechanic arts. These schools seem to be patterned after state agricultural and mechanical colleges, but offering only instruction of secondary grade. A good example of this type is the California Polytechnic School, which was opened in 1903 at San Luis Obispo. This institution is supported by the state, and is intended "to furnish to the young people of both sexes mental and manual training in arts and sciences, including agriculture, mechanical engineering, business methods, domestic economy, and such other branches as will fit students for non-professional walks of life" (12, p. 22).

Agricultural education in State Normal Schools has already been discussed in a previous article of this series.⁸ Instruction in agriculture in these schools is usually of secondary grade but with the special aim of preparing teachers. In some of these schools considerable emphasis is placed upon agriculture, and work corresponding to some of the best agricultural high schools is offered. For example, the Cape Girardeau (Mo.) State Normal School has a department of agriculture not only for teachers but for furnishing "young men from the farm an opportunity of obtaining the equivalent of a good high-school education of such a nature as will fit them to carry on the business of farming according to the most approved farm methods" (139, p. 63).

The development of secondary agricultural instruction has proceeded along two lines, one by employing existing high schools, the other in organizing separate agricultural high schools. The recent tendency as indicated by the statistical summary introducing this discussion seems strongly in the direction of the former. No doubt there is much to be said in favor of separate agricultural high schools to meet conditions in certain localities, but taking the country as a whole the natural tendency,

⁸ This journal, Vol. X, No. 8.

as above indicated, of maintaining the unity of our present school organization presents obvious advantages which the public has already begun to realize.

Attention should be given, in this connection, to the fact that much misapprehension and undue concern exists as to the plan of organization of the agricultural high school. A careful analysis of the course of study of the average agricultural high school will show less divergence from the plan of the ordinary high school than many suppose. It will be found that the courses of study are essentially the same in many particulars, the chief difference being the substitution of agricultural and household arts subjects for the foreign languages, with perhaps more emphasis on the practical side of the sciences and less emphasis on certain phases of mathematics⁴ (140).

One real difficulty in making the most of agriculture as a school subject lies in the fact that there is little opportunity for agricultural practice corresponding to shop practice in mechanic arts. The most active season of agricultural work is during the summer vacation. This difficulty may be met in the way already referred to in the account of the Baltimore County (Md.) Agricultural High School, where the teacher of agriculture devotes the usual summer vacation period to looking after experiments being conducted by the pupils. This matter has been carefully studied by a special agent of the Massachusetts State Board of Education and conclusions submitted to the legislature in the form of a *Report of the Board of Education on Agricultural Education* (141). Provision for proper farm practice as recommended in this report is secured by part-time work in agriculture which may utilize "home land, equipment, and time, outside school hours, for practical training supervised by the school." The scheme is worked out in considerable detail by means of concrete examples of various "farming projects" that may be undertaken. Among the major projects suggested are caring for a kitchen garden, keeping a pen of poultry, caring for a selected part of an orchard, raising a specified crop of potatoes, caring for one cow. Each major project is broken up into minor projects. For example, keeping

a pen of poultry would include as minor projects building a poultry house according to plans and specifications worked out at school. This in turn is divided into such subordinate minor projects as are necessary for successful completion, such as selecting a site for the house, taking into consideration: soil as related to poultry culture, underdrainage, conditions of sunlight and shade, convenience of access, etc. It seems likely that the legislation proposed by this report will be passed by the legislature now in session. If the proposed plan goes into effect, its results should be carefully studied by all who are interested in secondary agricultural education.

The rapid introduction of agriculture in high schools is responsible, in part at least, for two interesting educational reactions. One is the changed attitude of colleges toward agriculture as an entrance unit. A few years ago most colleges refused to give any credit for work done in this subject in high schools. Now 36 colleges actually recognize the subject and 27 express a willingness to do so when it is offered as an entrance unit, and several other colleges are considering the matter (142).

The other reaction is upon the method of presenting secondary science. There is now a growing tendency to relate science instruction more and more to the practical affairs of life (143). Recent experiments seem to justify this method of approach to a science even when judged from the point of view of pure science (144, 145).

Agricultural colleges are now well established, and their problems are largely matters of detail and of research. The problems of agricultural education are now being shifted to the secondary schools offering agricultural instruction. There is a great diversity, not only in respect to types of schools, but also as to methods, time devoted to the subject, equipment, qualification of teachers, and in other respects. But of the widespread interest there can be no doubt. The results on the whole promise much for the development of rural education and redirection of rural schools.

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B. M. DAVIS, *Proceedings of the National Education Association for 1908*, 1189-94.

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125. "The District Schools in a County as Educational and Social Centers,"
JESSIE FIELD, National Society for the Study of Education, *Tenth Year-book*, Part II (1911), 17-19.

In the county system described agricultural studies are an important means for bringing the school and community into a closer relation. The subjects are not uniform in the various schools of the county but are chosen primarily because of some dominant community interest.

126. *The Teaching of Agriculture in the High School*, G. A. BRICKER. New York: Macmillan (1911), XXV, 202.

The subject is considered from a teaching standpoint in the following chapters: "Nature of Secondary Agriculture"; "Rise and Development of Secondary Education in Agriculture in the United States"; "Social Results"; "As a Separate Science"; "Psychological Determination of Sequence"; "Seasonal Determination of Sequence"; "Organization of the Course"; "Aims and Methods of Presentation"; "Organization of the Laboratory and Field Work"; "Illustrative List of Classified Exercises"; "Educational Aims, Values, and Ideals." This is the first attempt to present in detail the problems of secondary agriculture from the point of view of instruction.

127. "The School of Agriculture," *University of Minnesota Bulletin*, XIII, No. 10 (1910), 66.

Annual announcement of the School of Agriculture connected with the University of Minnesota.

128. *Secondary Agricultural Education in Alabama*, C. J. OWENS, United States Department of Agriculture, Office of Experiment Stations, Bulletin 220 (1909), 30.

This bulletin contains "concrete information as to methods of organizing, courses of study, needed equipment, and cost of secondary agricultural schools."

129. *First Annual Report of the Congressional District Agricultural Schools of Georgia*, Georgia State College of Agriculture, Bulletin for December, 1909.

A complete account of the organization of these schools is given.

130. *Agricultural High School*, B. H. CROCHERON, Philopolis, Md. Prospectus of the Baltimore (Md.) Agricultural High School (1909).

A brief account of the foundation, purpose, entrance requirements, courses of study, and equipment of this school.

131. "Community Work in the Agricultural High School," B. H. CROCHERON, National Society for the Study of Education, *Tenth Yearbook*, Part II (1911), 9-16.

A detailed description of the community work undertaken by the Baltimore (Md.) County Agricultural High School. It includes an account of the school, its organization, and work among the farmers, farmers' wives, and young people of the community. This paper shows the great possibilities of a rural high school in its service to an entire community, children and adults as well.

132. "Elementary Agriculture in the New Holland (Ohio) High School," G. A. BRICKER, *Ohio Agricultural College Extension Bulletin*, III, No. 7 (1908), 6.

A brief description of the organization of work in agriculture with concrete examples of some of the things actually accomplished.

133. "The John Swaney School," V. C. KAYS, *Nature-Study Review*, IV, No. 9 (1908), 271-75.

An account of the history and of the first two years' experience of this school. It is in the country, "planned and built by country people for the education of country children."

134. *Opportunity for the California High School: Industrial and Agricultural Education*, EDWARD HIATT, California State Department of Education, Special Bulletin (July, 1910), 21.

This bulletin describes the plans for introducing agriculture in the high school of the city of Stockton, Cal.

135. "Agriculture in the Secondary Schools of California," E. B. BABCOCK, *Nature-Study Review*, V (1909), 210-18.

The work of several high schools giving instruction in agriculture is described. The article includes extracts from a report of F. H. Bolster of the Gardena (Los Angeles City) High School. This is of particular interest as it is claimed that the Gardena High School is the first city high school to "offer agriculture as the one principal purpose of the school."

136. "The State High School," A. E. PICKARD, *Hinckley (Minn.) High School Bulletin* (1910), 23.

A full account of this school is given, including courses of study, general information as to admission, expenses, certificates, scope and purposes of courses, etc., detailed description of work offered in agriculture, manual training, domestic science, and normal work. This school is one of the ten high schools of Minnesota receiving state aid. All of these schools are similar in organization to this one.

137. *Schools of Agriculture, Mechanic Arts, and Home Making*, F. W. HOWE, New York State Department of Education, Special Circular (November 1, 1910).

This circular contains a "general statement in reference to the relations of this type of school to the so-called "trade schools," and the responsibility of the Division of Trade Schools in respect to it, and the text of the law relating to these schools, notes on this law, brief descriptions of some typical schools teaching agriculture, mechanic arts, and home-making, a list of books, periodicals, and national and state publications dealing with agriculture, farm mechanics, and household economy.

138. "Syllabus for Secondary Schools: Agriculture," *ibid.*, Annual Report (1910), III, 1-102.

This syllabus includes apple growing, general fruit growing, cereal and forage crops, potato growing, dairy husbandry, animal husbandry, poultry husbandry. Each subject is presented as a series of exercises, giving the object of the exercise, materials, and directions for study.

139. Department of Agriculture, E. A. COKEFAIR, Cape Girardeau, Mo.: *The Missouri State Normal School Bulletin*, Catalogue Number (1909), 63-67.

A description of objects of work offered and detailed outline of course of study. It is of particular interest because provision is made for giving instruction to farmers as well as to teachers.

140. "The Curriculum of the Agricultural High School," STUART G. NOBLE, *The Mississippi School Journal*, XV (1911), 7-11.

The writer presents the results of a detailed study of the curricula of the agricultural high schools of Alabama, Georgia, and Mississippi.

141. *Report of the Board of Education on Agricultural Education*, R. W. STIMSON, *et al.*, Massachusetts State Department of Education, Special Report (1911), 104.

This report was prepared for the state legislature which requested that an investigation be made as to the advisability of establishing a system of agricultural education throughout the commonwealth. The matter presented in this report is a valuable contribution to the literature of agricultural education because it outlines some plans not hitherto undertaken in agricultural instruction.

142. "Report of Committee on Encouraging College-Entrance Credit in High-School Agriculture," A. B. GRAHAM, *Proceedings of the National Education Association for 1910*, 480-83.

This report is the result of an investigation of a committee appointed the previous year by the Department of Rural and Agricultural Education of the N.E.A.

143. "Practical Aspects of Science in Secondary Education," W. R. HART, *et al.*, *ibid.*, 446-80.

This general topic was discussed at a joint session of the departments of secondary, of science, and of rural and agricultural education. Following the presentation of the pedagogical and scientific viewpoints are brief discussions of the subject as related to the various sciences usually taught in high schools.

144. "An Experiment of Methods of Teaching Zoölogy," J. P. GILBERT, *Journal of Educational Psychology* (June, 1910), 321-32.

This paper is a preliminary report of a series of investigations "to determine the relative merits of the pure-science and applied-science methods of approach in teaching secondary science."

145. *Ibid.*, *School Science and Mathematics*, XI, No. 3 (March, 1911), 205-15.

A further report of the experiment referred to in 144. The following significant statement occurs among the conclusions of the author: "In former discussions those who advocated applied science have been forced to take the defensive. While the data here obtained do not finally settle the question of the relative merits of the pure-science and applied-science approach to secondary-school zoölogy, they do shift the burden of proof to those who advocate the cultural approach."